WATER DAMAGE INVESTIGATION

Department of Developmental Services
340 Main Street
Worcester, Massachusetts

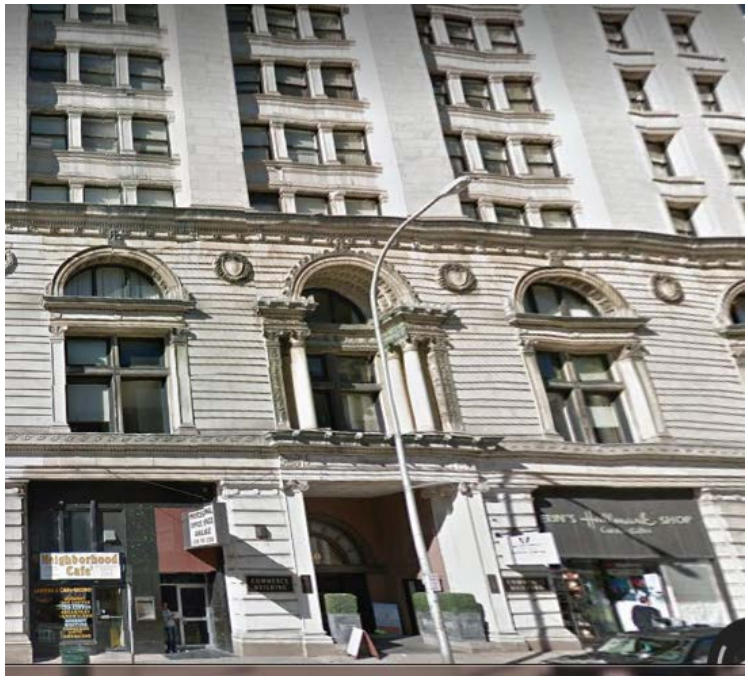


Photo: Google Maps

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health
Indoor Air Quality Program
December 2018

BACKGROUND

Building:	Department of Developmental Services (DDS)
Address:	340 Main Street, Worcester, MA
Assessment Requested by:	Deborah Coleman, EHS Facilities Deputy Director for Finance and Operations, EOHHS
Reason for Request:	Water damage concerns
Date of Assessment:	November 20, 2018
Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment:	Jason Dustin, Environmental Analyst/Inspector, Indoor Air Quality (IAQ) Program
Building Description:	The DDS office is on the fifth floor of a nine story building built in 1906. The office contains carpet tiles, gypsum wallboard (GW) and suspended ceiling tiles.
Windows:	Some windows are openable.

IAQ Testing Results

Please refer to the IAQ Manual for methods, sampling procedures, and interpretation of results (MDPH, 2015). The following is a summary of testing results (Table 1).

- ***Carbon dioxide*** levels were below the MDPH recommended level of 800 parts per million (ppm) in all but one area indicating the affected space has adequate air exchange in most areas.
- ***Temperature*** was within or just below the MDPH recommended range of 70°F to 78°F at the time of assessment.
- ***Relative humidity*** was below the MDPH recommended range of 40 to 60% in the majority of areas tested.
- ***Carbon monoxide*** levels were non-detectable (ND) in all areas tested.
- ***Particulate matter (PM2.5)*** concentrations measured were below the National Ambient Air Quality (NAAQS) level of 35 $\mu g/m^3$ in all areas tested.
- ***Total Volatile Organic Compounds (TVOCs):*** levels were ND in all areas assessed.

Background and Discussion

The BEH/IAQ Program was asked to examine the DDS office for the presence of water damage/mold growth, with a focus on areas that were damaged by an HVAC leak that reportedly occurred in the summer of 2018 as well as a separate incident in an adjacent stairwell that occurred in September of 2018. Building management reported that the HVAC leak originated in a utility closet on the vacant 6th floor above the DDS space. A plumbing connection of PVC and copper pipe reportedly failed due to vibration (Picture 1). The leak reportedly wet ceiling tiles and carpet tiles in a number of areas throughout the space (Pictures 2 and 3). The water level on the floor was reported to be highest in offices #50 and #54 which was noted to have vinyl baseboard coving (Picture 4). Building management reportedly responded by using water extractors, fans, and dehumidifiers to remove moisture as soon as the leak was discovered. Ceiling tiles and furniture/items were removed, and areas were treated with an antimicrobial solution and cleaned again thereafter. Building occupants were relocated during remediation activities. Due to the excessive humidity during the summer months, building management left fans, dehumidifiers, and extra window air conditioners in place for several weeks to aid in keeping the DDS space dry.

Building management also reported that the hot water line in the rear stairwell had a slow leak prior to its discovery. Fortunately, the building materials in the stairwell (Picture 5) consist of materials which are not typically conducive to mold growth (e.g., plaster, concrete). Dust and debris on these materials can however serve as a medium for colonization if chronically moistened. Water extraction, fans, and dehumidifiers were also used in this leak incident. Some occupants expressed complaints regarding odors emanating from the stairwell during the remediation for this incident.

At the time of assessment, all porous materials (i.e., carpet, ceiling tiles and GW) were dry and no visible mold/associated odor was observed/detected apart from a slight musty odor in the rear corner of the space ("Q unit"). Some occupants reported that this odor predated this water damage event. It is important to note that relative humidity levels were within/below the 2018 recommended range of 40 to 60% in all areas tested, suggesting that no sources of lingering moisture were present at the time of this assessment. All IAQ parameters measured in the affected areas were within/below MDPH guidelines at the time of this assessment (Table 1) with

the exception of one slightly elevated carbon dioxide reading, indicating the need for a slight increase in ventilation in this area.

In general, the US Environmental Protection Agency (US EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommends that porous materials (e.g., wallboard, carpeting) be dried with fans and heating within 24 to 48 hours of becoming wet (US EPA, 2008; ACGIH, 1989). If porous materials are not dried within this time frame, mold growth may occur. However, it is important to note that carpeting in the DDS office is a thin, commercial grade carpet tile with no padding/backing (unlike in homes), which allows it to dry relatively quickly.

It was not clear if the carpeting undergoes a regular cleaning program. Carpets should be vacuumed regularly with a high efficiency particulate arrestance (HEPA) filter equipped vacuum cleaner and cleaned annually (or semi-annually in soiled/high traffic areas) in accordance with Institute of Inspection, Cleaning and Restoration Certification (IICRC) recommendations, (IICRC, 2012).

Conclusions/Recommendations

Based on the observations made during the visit, the following recommendations are made:

1. Continue with plans to work with building management to find the source of the slight musty odor in the rear corner of the Q unit (near stairwell/bathroom area). Actions may include:
    - Any porous items (cardboard, papers, personal effects, carpeting, GW, etc.) that were not properly dried should be discarded.
    - Plants in the area should be inspected for overwatering or placement on porous items.
    - Any water fountains or refrigerators should be placed on water proof trays.
    - Inspect the rear stairwell for any accumulated dust/debris or pathways that may be the source of lingering odors in that area.
    - The bathroom in that area should be inspected for water-damaged building materials or accumulated debris as well as a properly functioning exhaust fan.
2. Seal any pathways between this space and the stairwell where the chronic water leak occurred (e.g., install tight fitting door strip/gasket; seal any holes in walls or above ceiling tiles leading to the stairwell).

3. Inspect areas behind vinyl coving for any microbial contamination in offices #50 and #54 since this material typically hinders adequate drying following water damage events especially during humid weather. Remove and replace coving/lower portion of GW if necessary.
4. Clean carpeting in accordance with IICRC recommendations (IICRC, 2012).
5. Operate HVAC system/set thermostat to fan "on" (continuous) mode vs "auto" to facilitate air exchange.
6. For more information on mold refer to the US EPA's "Mold Remediation in Schools and Commercial Buildings". Available at: http://www.epa.gov/mold/mold-remediation-schools-and-commercial-buildings-guide.
7. Refer to resource manuals and other related IAQ documents for further building-wide evaluations and advice on maintaining public buildings. Copies of these materials are located on the MDPH's website: http://mass.gov/dph/iaq.

REFERENCES

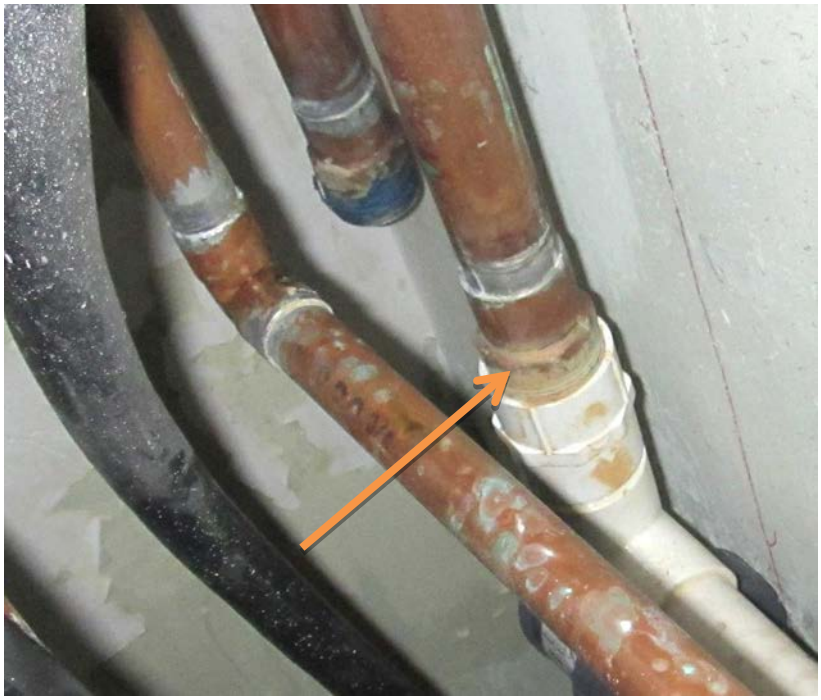
ACGIH. 1989. Guidelines for the Assessment of Bioaerosols in the Indoor Environment. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

IICRC. 2012. Institute of Inspection, Cleaning and Restoration Certification. Carpet Cleaning: FAQ.

MDPH. 2015. Massachusetts Department of Public Health. "Indoor Air Quality Manual: Chapters I-III". Available at: http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/.

US EPA. 2008. Mold Remediation in Schools and Commercial Buildings. US Environmental Protection Agency, Office of Air and Radiation, Indoor Environments Division, Washington, D.C. EPA 402-K-01-001. http://www.epa.gov/mold/mold-remediation-schools-and-commercial-buildings-guide.

Picture 1

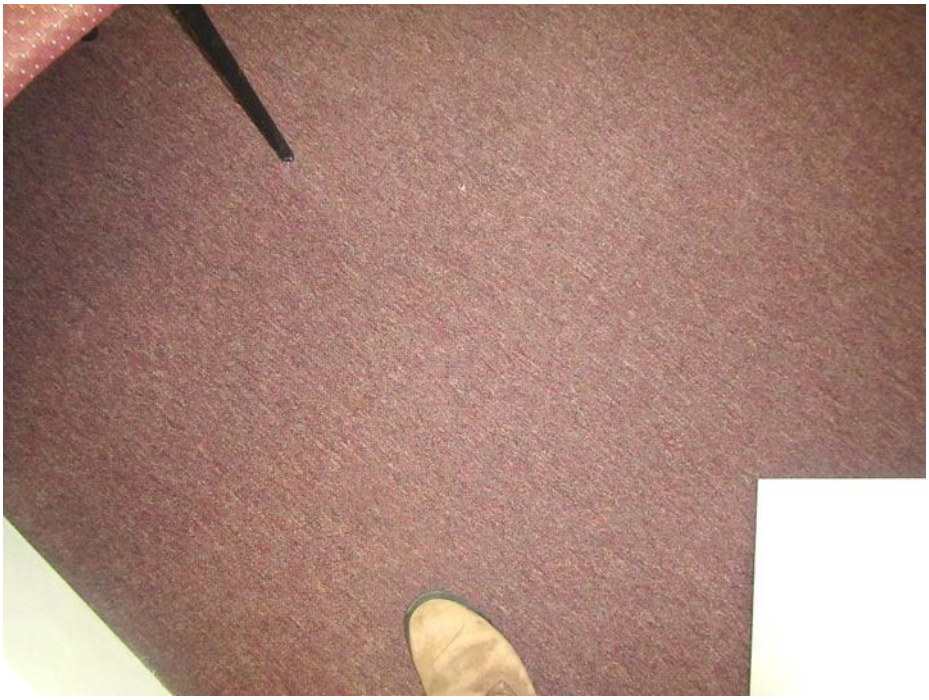


Cooling line joint with PVC was origination of water leak

Picture 2

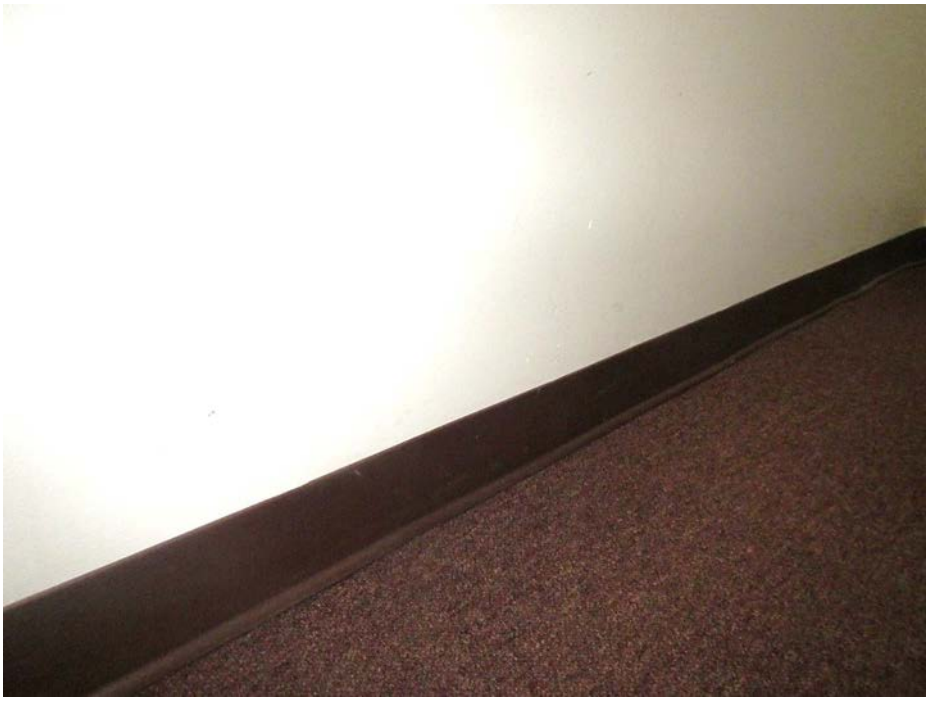
Area of water-damaged ceiling tiles that were replaced

Picture 3



Area of water-damaged carpet tiles that were remediated

Picture 4



Water-damaged office with vinyl baseboard that was left in place

Picture 5

Site of 2nd leak in stairwell; note plaster walls

Location: DDS **Indoor Air Results**

Address: 340 Main St, Worcester **Table 1** **Date: 11/20/2018**

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m^3)	TVOC (ppm)	Occupants in Room	Windows Openable	Ventilation		Remarks
									Supply	Exhaust	
Background	468	ND	32	91	17	ND	-	-	-	-	Light snow
Main open area-front	982	ND	67	44	2	ND	5	Y	Y	Y	New ceiling tiles, some carpet tiles replaced, antimicrobial application, cleaned, dried/remediated
Office #50	765	ND	68	39	1	ND	0	Y	Y	Y	Had standing water, restoration activities, vinyl coving remained
Main open area-rear	688	ND	69	38	1	ND	0	Y	Y	Y	
Office #54	664	ND	72	38	1	ND	1	Y	Y	Y	Had standing water, restoration activities, vinyl coving remained
Right rear corner- “Q” unit	647	ND	71	37	2	ND	2	Y	Y	Y	Very slight musty odor which was reported to exist prior to recent water damage events, near bathroom/stairwell

ppm = parts per million ND = non detect µg/m^3 = micrograms per cubic meter

Comfort Guidelines

Carbon Dioxide:	< 800 = preferable	Temperature:	70 - 78 °F
	> 800 ppm = indicative of ventilation problems	Relative Humidity:	40 - 60%